

**927. Comparative Nutrition — Protein Metabolism and Developmental Biology**

Winter of even-numbered years. 4(4-0) BCH 452, PSL 502 or concurrently. Interdepartmental with Animal Husbandry Department. Protein quality assessment, protein status, protein calorie malnutrition, amino acid metabolism, protein turnover, digestion and absorption, hormonal control of protein metabolism, developmental aspects of protein metabolism and growth.

**928. Comparative Nutrition — Minerals**

Spring of even-numbered years. 3 credits. BCH 452, PSL 502. Interdepartmental with and administered by the Animal Husbandry Department. Forms and location in body, metabolic roles, deficiency and toxicity signs, interrelationships, requirements and biological availability of sources.

**929. Comparative Nutrition — Vitamins**

Winter of odd-numbered years. 3(3-0) BCH 452 and a previous course on principles of nutrition. Interdepartmental with and administered by the Animal Husbandry Department. Chemical and physical properties, standards of activity, occurrence, metabolic roles, antivitamins, deficiency and toxicity signs, requirements and factors affecting requirements.

**999. Research**

(FN 999.) Fall, Winter, Spring, Summer. Variable credit. Approval of department.

**FOOD SYSTEMS ECONOMICS AND MANAGEMENT**

See Agricultural Economics

**FOREIGN LANGUAGES**

See German and Russian, Linguistics and Oriental and African Languages, and Romance Languages.

**FORESTRY FOR**

**College of Agriculture and Natural Resources**

**200. Resource Ecology and Man**

For course description, see Interdisciplinary Courses.

**202. Introduction to Forestry**

Fall. 3(3-0)  
Forestry in its broadest sense, including: historic development, forest growth, protection and management, products, national and world economy and policy. Emphasis on multiple use concepts. One-day field trip required.

**204. Forest Vegetation**

Fall, Spring. 5(3-4) BOT 205 or approval of department.  
Nomenclature, classification, and identification of important trees, shrubs, and herbaceous plants of forest and field.

**220. Plants and Their Environment**

Winter. 3(3-0) Interdepartmental with Natural Resources.  
Fundamental ecological relationships between various climatic, edaphic and biotic environmental factors of the ecosystem and plant response, including structure, function and evaluation of species.

**301. Quantitative Methods for Natural Resources**

Fall. 4(3-3) MTH 109 or 111.  
Collection and analysis of information pertaining to natural resources. Survey design, field procedures, equipment, and analytical techniques.

**302. Forest Inventory**

Winter. 3(2-3) 301.  
Field and office techniques of forest inventory, with primary emphasis on timber resources.

**305. Silviculture**

Fall. 4(3-3) 204.  
Interrelationships of trees of the forest community and the environment; natural and artificial forest reproduction methods; intermediate cuttings; field studies of silvicultural conditions.

**306. Forest Fire Protection and Use**

Spring. 3(3-0) Juniors or approval of department.  
Causes and effects of forest fires. Combustion, fire behavior, and fire weather. Prevention and control planning and techniques. Use of fire in forest land management. One-day field trip required.

**309. Wood Technology**

Fall. 4(3-3)  
Structure of wood. Mechanical and physical properties of wood. Wood anatomy and relation to growth.

**319. Forestry Today**

(419.) Spring. 3(3-0) Not open to majors.  
For the non-forestry student, emphasizing multiple use of forests, scope and practice of forestry, environmental roles of forests, influences, products, non-timber uses of forests and current forest policy.

**409. Forest Hydrology**

Winter. 3(3-0) SLS 210.  
Hydrologic cycle, with emphasis on soil, water and ground water regimes; instrumentation and measurement of the various components. Effects of forest management on watersheds and water yields.

**410. Forest Tree Improvement**

Fall. 3(2-2)  
Distribution of genetic variation in natural tree populations. Introduction, selection, progeny testing, species hybridization, and polyploidy to obtain superior tree populations.

**411. Tree Physiology**

Fall. 3(3-0) BOT 301.  
The fundamental principles of plant physiology with particular reference to the growth and development of woody plants, and consideration of the influence of genetic and environmental factors on physiological processes in trees.

**424. Forest Soils**

Spring. 4(3-3) 220; SLS 210. Interdepartmental with Soil Science.  
Interrelationships of forest site and the growth of forests. Classification and productivity of forest soils. Effects of silvicultural and forest management practices on the soil. Two-day field trip required.

**430. Manufacture of Lumber and Composite Wood Products**

Winter. 3(3-0) 309.  
Log and lumber grades, sawmill equipment and practices. Wood working machinery. Gluing of wood. Manufacture of pulp, plywood and other board products.

**431. Finishing, Preservation and Drying of Wood**

Spring. 3(3-0) 309.  
Properties, selection, application of decorative and protective coatings, wood preservatives and fire retardants. Air and kiln drying of lumber.

**432. Methods in Wood Science**

Spring. 3(2-2) 309.  
Application of standard laboratory testing procedures to the evaluation of basic properties of solid wood and wood products. Laboratory exercises in wood microtechnique and wood finishings.

**446. Range Management**

Winter. 4(3-3) 220 or approval of department.  
Development of range industry; grazing regions and reconnaissance; planning multiple-use management on forest range and watershed.

**449. Field Studies in Forestry**

Fall. 3 credits. 302, 305.  
Multiple use forest resource management in various forest regions. Two-week field trip required, prior to the fall term of the senior year.

**450. Natural Resource Administration**

Fall, Spring. 4(4-0) Interdepartmental with Fisheries and Wildlife, Parks and Recreation Resources and Resource Development Departments and Natural Resources.  
Concepts and methods of administering wildlife properties. The legal, economic and social environment. Benefit-cost analysis of management changes. Unit organization, personnel management and accounting. Presents a systems view of administration.

**454. World Forestry**

Winter. 3(3-0)  
Forest resources, forestry practices, and the forest economy throughout the world.

**455. Forestry Economics**

Winter. 4(3-2) 450 or approval of department.  
Basic economic and political principles and techniques that govern the production and consumption of forest land products, including basic forest valuation procedures.

**457. Forest Management and Utilization Planning**

Spring. 5(4-2) 455.  
Integrative planning for forest management, including multiple-use aspects and timber harvesting systems.

**460. Arboriculture**

Spring. 3(2-3) Approval of department.  
Principles and techniques of species selection, establishment, and cultural practices used in the care and maintenance of shade and ornamental trees. Two-day field trip required.

**465. Forest and Wood Science Problems**

Fall, Winter, Spring, Summer. 1 to 5 credits. Seniors with a 2.80 average, or approval of department.  
Special problems course for students qualified for advanced study in some phase of forestry or wood science.

**491. Natural Resources and Modern Society**

Spring, Summer. 3(3-0) Juniors.  
Interdepartmental with the Resource Development Department and Natural Resources.

A survey of the social and economic significance of natural resources in modern industrial and urban society. Current problems of natural resources management and use are examined in terms of the society in which they exist.

**807. Special Problems**

Fall, Winter, Spring, Summer. 2 to 5 credits. May re-enroll for credit with a maximum of 10 credits.

Advanced work in any of the following forestry specialties: administration biometrics, photogrammetry, dendrology, silviculture, management, economics, influences, ecology, genetics, arboriculture, hydrology, soils, recreation, physiology, policy, entomology, products harvesting, wood preservation, timber mechanics, wood conversion.

**809. Natural Resources Economics**

Winter. 3(3-0) Approval of department. Interdepartmental with the Resource Development Department.

Applications of economic analysis to natural resource problems.

**828. Seminar**

Fall, Winter, Spring. 1 to 3 credits. May re-enroll for a maximum of 12 credits if a different topic is taken.

Critical study and discussion of advanced forestry topics including natural resource economics, forest biology, and natural resource program budgeting.

**830. Physiological Genetics**

Winter. 3(3-0) Approval of department. Interdepartmental with Crop Science.

Physiological bases for genetic variation in higher plants including adaptive physiology, quantitative genetics, growth correlations, biochemical genetics, hybrid physiology, and geneecology.

**850. Administering the Public Land Agency**

Spring. 4(4-0) 450 or approval of department.

Case studies of administrative problems in land management agencies. Students are organized as teams and prepare team reports on specified aspects of each case.

**851. Public Program Budgeting**

Fall. 3(3-0) Approval of department. Interdepartmental with the Resource Development Department.

Survey of the federal government's planning-programming-budgeting system, stressing executive branch budget decision-making and budget administration in the natural resource bureaus.

**855. Research Methods**

Fall. 3(3-0) Approval of Department. Interdepartmental with and administered by the Resource Development Department.

Research techniques applicable to management, and policy-oriented natural resource investigations. Analysis of project designs; preparation of project proposals. Evaluation of representative published research studies.

**899. Research**

Fall, Winter, Spring, Summer. Variable credit. Approval of department.

**960. Simulation Models in Natural Resource Management**

Winter of odd-numbered years. 3(3-0) Approval of department. Interdepartmental with and administered by the Resource Development Department.

The role of simulation models in developing management strategies. Applications of com-

puter simulation in natural resources. Modeling of decision systems in natural resources management.

**999. Research**

Fall, Winter, Spring, Summer. Variable credit. Approval of department.

**FRENCH**

See Romance Languages

**GEOGRAPHY**

**College of Social Science**

Courses are classified as follows:

- Cultural—301, 307, 404, 801, 901.
- Economic—213, 309, 409, 412, 413, 435, 454, 806, 807, 809, 835, 906.
- Field Techniques—415, 850.
- Geographic Education—458, 858.
- Historical—310, 810, 910.
- Independent Research—400H, 411, 818, 899, 918, 999.
- Medical—470, 870, 970.
- Physical—206, 206L, 429, 430, 431, 432, 451, 834, 902.
- Political—416, 808, 908.
- Population—320, 836, 934.
- Quantitative Methods—427, 428, 811.
- Regional—204, 300, 405, 406, 407, 408, 418, 420, 421, 440, 441, 450, 460, 461, 462, 463, 464, 812, 912.
- Theory and Philosophy—150, 425, 480, 825, 826, 827.
- Urban—318, 402, 403, 805.
- Visual Media and Techniques—222, 223, 324, 424, 426.

**150. Geography of Selected Current Problems**

Fall. 2(2-0)

The geographic perspective is used to examine U. S. and world problems of major concern such as international conflicts, environment quality, spatial change, and economic development.

**200. Resource Ecology and Man**

For course description, see Interdisciplinary Courses.

**203. Introduction to Study of the Moon**

For course description, see Interdisciplinary Courses.

**204. World Regional Geography**

Fall, Winter, Spring, Summer. 4(4-0)

Man's relationship with natural and cultural environments.

**206. Physical Geography**

Fall, Winter, Spring, Summer. 4(4-0)

Principal earth surface elements of physical geography including weather, climate, landforms, soils, water and biotic resources, in their genetics, distributional and functional interrelationships.

**206L. Physical Geography Laboratory**

Fall, Winter, Spring. 1(0-2) 206 or concurrently.

Laboratory study of geographic aspects of map interpretation, aerial photographs, weather, climate, soils, landforms, and vegetation.

**213. Economic Geography**

Fall, Winter, Spring, Summer. 3(3-0)

Emphasis on world distribution of economic and business activities, stressing factors of location and economic concepts of locational change.

**222. The World of Maps**

Fall. 3(3-0).

Discussion of types, practical applications, and sources of maps.

**223. Introduction to Cartography**

Fall, Winter, Spring. 4(1-6)

Principles and techniques of constructing maps and other graphic devices. Types of map reproduction, application of quantitative methods to cartography.

**280. Perspectives on Geography**

Spring. 2(2-0)

Introduction to the profession of geography for majors.

**300. Geography of North America**

Fall, Winter, Summer. 4(3-0)

Human and physical geography of North America, north of the Mexican border.

**301. Geography of Culture**

(401.) Fall, Winter, Spring, Summer. 4(3-0) 204.

A systematic discussion of cultural geography, stressing cultural processes and relationships.

**307. Geography of Environmental Quality**

(419.) Spring. 4(3-0)

Identification of the physical, cultural and psychological factors which constitute human environments, and how they vary and may be modified or controlled.

**309. Geography of Recreation**

Winter. 3(3-0)

Recreational land use and services in the United States, including analysis of resources basic to such land use and their distribution.

**310. Historical Geography of the United States**

Spring, Summer. 4(3-0)

Reconstruction of geographies of the United States as they existed in the past.

**318. Cities of the World**

Fall, Winter, Spring, Summer. 4(3-0)

A cross-cultural examination of cities, their historic growth, regional functions, and internal dynamics.

**320. Geography of Population**

Fall. 4(3-0).

A geographical analysis of world population including demographic characteristics, growth rates, and distributional patterns.

**324. Remote Sensing: Airphoto Interpretation**

Fall, Winter. 4(2-4) Sophomores.

Use of aerial photographs in the identification and interpretation of physical and cultural features of the terrestrial environment. Includes principles of photogrammetry.